REMARKS

Claims 1-3, 10-11, 13, 16-17, 20-22, 29-30, 32, 35-37, 44-45, 47, 50-52, 59-60, 62, 65-67, 69, 74-76, and 78 have been amended. No new matter has been added. Claims 1-82 remain pending in the Application. Applicant respectfully requests reconsideration in view of the foregoing amendments and the following remarks.

I.   35 U.S.C. § 102 Rejections

The Examiner rejected claims 1-82 under 35 U.S.C. § 102(e) as allegedly unpatentable over U.S. Patent No. 7,088,782 B1 (hereinafter referred to as "Mody"). Applicant respectfully traverses this rejection.

a.   Claim 1 and its dependent claims

Claim 1 as amended is directed to a method that includes transmitting a first training symbol on a plurality of antennas. The first training symbol comprises a plurality of data symbols, and each of the plurality of data symbols corresponds to different ones of a plurality of tones. Each of the plurality of antennas transmits a corresponding one of the plurality of data symbols.

The Examiner suggests that Mody teaches all of the limitations recited in claim 1. Applicant respectfully disagrees. Applicant respectfully asserts that Mody does not teach or suggest, at least, a first training symbol that comprises a plurality of data symbols, wherein each of the plurality of data symbols corresponds to different ones of a plurality of tones, and wherein each of [a] plurality of antennas transmits a corresponding one of the plurality of data symbols.

Mody shows a wireless communication system for synchronizing and transmitting data. (Abstract). A data source at a transmitter provides an input stream of binary data, which is encoded and mapped into individual data symbols. (Col. 3, lines 37-43, 61-63; col. 4, lines 46-47). The data symbols are arranged into frames and separated over multiple "transmit diversity branches," corresponding to sub-channels "spaced apart from each other by a predetermined difference in frequency." (Col. 4, lines 2-5; col. 5, lines 47-53, 59-62). An inserter uses respective adders for each sub-channel to insert training symbols into the data frames. (Col. 6, lines 1-11). Each training symbol is unique to a particular sub-channel. (Col. 6, lines 20-22).

OFDM modulators modulate the data frames at frequencies corresponding to the different sub-channels, and transmitting antennas transmit the modulated frames to receiving antennas. (Col. 4, lines 24-31; col. 5, lines 59-68).

Applicant respectfully asserts that Mody does not teach or suggest, at least, a first training symbol that comprises a plurality of data symbols, wherein each of the plurality of data symbols corresponds to different ones of a plurality of tones, and wherein each of [a] plurality of antennas transmits a corresponding one of the plurality of data symbols. The Examiner suggests that Mody's training symbols are Applicant's claimed first training symbol. Despite the misleadingly similar terminology, however, Mody's training symbols are quite different from Applicants's claimed training symbol. In particular, Mody does not show a training symbol that comprises a plurality of data symbols, wherein each of the plurality of data symbols corresponds to different ones of a plurality of tones. Mody inserts different training symbols into data frames on each sub-channel. (Col. 6, lines 1-11). "The training symbols for each respective sub-channel may preferably be unique to the particular sub-channel." (Col. 6, lines 20-22). Each training symbol is specifically "designed and adjusted" to reflect channel-specific information necessary for synchronization and channel parameter estimation. (Col. 6, lines 23-28). Mody does not show a first training symbol including a plurality of data symbols correspond[ing] to different ones of a plurality of tones, i.e., to different ones of a plurality of channel frequencies. Rather, Mody's training symbols each correspond to a *single* frequency, i.e., to the frequency of the sub-channel for which the training signal is "uniquely" determined. Applicant respectfully asserts that claim 1 is allowable over Mody for at least this reason.

Additionally, Mody does not show a first training symbol that comprises a plurality of data symbols, wherein each of [a] plurality of antennas transmits a corresponding one of the plurality of data symbols. As discussed above, Mody uniquely creates a training symbol for each sub-channel. (Col. 6, lines 20-22). Each sub-channel, in turn, has a respective transmitting antenna which transmits at the sub-channel's particular frequency. (Col. 4, lines 5-7, 19-28). Mody does not show that each of the plurality of antennas transmits a corresponding one of the [training symbol's] plurality of data symbols. In other words, Mody does not show each antenna

separately transmitting one of the data signals (i.e., that is a portion of a single training symbol). Rather, Mody shows that each antenna transmits one or more entire training symbols and, more specifically, those training symbols that are uniquely created for its corresponding sub-channel. Mody's training signals are transmitted in their entirety; Mody's antennas do not transmit portions of any training symbol. Therefore, Applicant respectfully asserts that claim 1 is allowable over Mody for at least this additional reason.

Claims 2-9 depend from claim 1 and are allowable for at least the reasons set forth above with respect to claim 1.

Claim 2 is also separately allowable for at least the following additional reason. Claim 2 as amended recites transmitting a second training symbol that comprises the plurality of data symbols in the first training symbol, and that each of the plurality of antennas transmits a different one of the plurality of data symbols than in the first training symbol. The Examiner suggests that the N_1 symbol transmitted on Antenna 2, shown in Mody's Fig. 4, is Applicant's claimed second training symbol. As an initial matter, as discussed above, Mody does not show that each of the plurality of antennas transmits a different one of the plurality of data symbols [in the training symbol], i.e., does not show multiple antennas transmitting portions of a single training symbol. Rather, Mody shows that each antenna transmits only those training symbols uniquely corresponding to its sub-channel. Additionally, Applicant respectfully submits that Mody does not show transmitting a second training symbol that comprises the plurality of data symbols in the first training symbol. Mody's training symbols are "designed and adjusted" to be "unique to the particular sub-channel." (Col. 6, lines 20-24). The training symbols transmitted by any one of Mody's antennas – by Antenna 2, for example – will be different from the training symbols transmitted by any other antenna, and therefore Mody does not show a second training symbol comprising the plurality of data symbols in the first training symbol. Applicant respectfully asserts that claim 2 is allowable over Mody for at least this additional reason.

Claim 3 is also separately allowable for at least the following additional reason. Claim 3 as amended recites that the first training symbol has a first pattern in which each of the plurality of antennas transmits one of the plurality of data symbols on a first subset of tones, and the

second training symbol has a second pattern comprising a shifted pattern of the first pattern such that each of the plurality of antennas transmits a respective data symbol on a different subset of tones. The Examiner cites col. 7, lines 7-27 of Mody as meeting the recited claim limitations. However, the cited passage describes ways in which Mody uses symbols from different alphabets to generate training sequences; it has nothing to do with a second training symbol that includes a shifted pattern of a first training symbol. (Col. 7, lines 7-15). Additionally, as discussed above, Mody's training symbols are uniquely generated for each sub-channel. Mody's symbols do not include information relating to other sub-channels, i.e., do not include a second training symbol that has a second pattern comprising a shifted pattern of the first pattern [of a first training symbol]. Applicant respectfully asserts that claim 3 is allowable over Mody for at least this additional reason.

b. Claim 10 and its dependent claims

Claim 10 as amended is directed to a method that includes receiving a first training symbol transmitted by a plurality of antennas. The first training symbol includes a plurality of data symbols and each of the plurality of data symbols corresponds to different ones of a plurality of tones. Each of the plurality of data symbols is received from a corresponding one of the plurality of antennas. In response to at least the first training symbol, a gain is determined at each of the plurality of antennas for each of the plurality of tones.

As discussed above, Mody does not teach or suggest a first training symbol that comprises a plurality of data symbols, wherein each of the plurality of data symbols corresponds to a different one of a plurality of tones. Accordingly, Claim 10 is allowable for at least the reasons set forth above with respect to claim 1.

Claim 10 is also separately allowable for at least the following additional reason. Claim 10 recites determining a gain at each of the plurality of antennas for each of the plurality of tones. The Examiner suggests that Mody's synchronization circuit, shown in Fig. 8, meets this limitation. However, Mody's synchronization circuit does not determine a gain at each of the plurality of antennas for each of the plurality of tones. Mody's synchronization circuit corrects differences between the frequencies of the transmitter and receiver oscillators. (Col. 12, lines

45-51). The synchronization circuit estimates the starting times of received OFDM frames and generates corresponding feedback signals to a pre-amplifier and to frequency offset estimation and correction circuits. (Col. 12, lines 52-65). These feedback signals do not determine a gain at each of the plurality of antennas for each of the plurality of tones, i.e., do not determine the signal level at each antenna. Rather, the feedback signals "estimate[e] the approximate starting time of the OFDM frame." (Col. 12, lines 56-59). Applicant respectfully asserts that claim 10 is allowable over Mody for at least this additional reason.

Claims 11-19 depend from claim 10 and are allowable for at least the reasons set forth above with respect to claim 10.

Claim 11 is also separately allowable for at least the following additional reason. Claim 11 as amended recites that determining a gain includes, for each of the plurality of antennas, interpolating values for a plurality of said tones from the corresponding plurality of data symbols received from said antenna. The Examiner cites col. 6, lines 1-15 of Mody as meeting the recited claim limitations. However, the cited passage does not relate to either interpolation or determining a gain. In fact, nowhere does Mody show determining a gain by interpolating values for a plurality of said tones from the corresponding plurality of data symbols received from said antenna. Applicant respectfully asserts that claim 11 is allowable over Mody for at least this additional reason.

c. Claim 16 and its dependent claims

Claim 16 as amended is directed to a preamble structure including a first training symbol having a plurality of data symbols. Each of the plurality of data symbols corresponds to different ones of a plurality of tones. Each of a plurality of subsets of the plurality of data symbols is designated to be transmitted by a corresponding one of a plurality of antennas.

As discussed above, Mody does not teach or suggest a first training symbol that comprises a plurality of data symbols, wherein each of the plurality of data symbols corresponds to different ones of a plurality of tones. Accordingly, claim 16 is allowable for at least the reasons set forth above with respect to claim 1.

Claims 17-19 depend from claim 16 and are allowable for at least the reasons set forth above with respect to claim 16.

d. Claim 20 and its dependent claims

Claim 20 as amended is directed to an apparatus including a training module that transmits a first training symbol on a plurality of antennas. The first training symbol includes a plurality of data symbols, and each of the plurality of data symbols corresponds to different ones of a plurality of tones. Each of the plurality of antennas transmits a corresponding one of the plurality of data symbols.

Claim 20 is allowable for at least the reasons set forth above with respect to claim 1.

Claims 21-28 depend from claim 20 and are allowable for at least the reasons set forth above with respect to claim 20.

Claim 21 is also separately allowable for at least the reasons set forth above with respect to claim 2.

Claim 22 is also separately allowable for at least the reasons set forth above with respect to claim 3.

Claim 23 is also separately allowable for at least the reasons set forth above with respect to claim 4.

e. Claim 29 and its dependent claims

Claim 29 as amended is directed to an apparatus including a training module that receives a first training symbol transmitted by a plurality of antennas. The first training symbol includes a plurality of data symbols, and each of the plurality of data symbols corresponds to different ones of a plurality of tones. Each of a plurality of subsets of the plurality of data symbols is received from a corresponding one of the plurality of antennas. In response to at least the first training symbol, a gain is determined at each of the plurality of antennas for each of the plurality of tones.

As discussed above, Mody does not teach or suggest a first training symbol that comprises a plurality of data symbols, wherein each of the plurality of data symbols corresponds

to different ones of a plurality of tones. Accordingly, claim 29 is allowable for at least the reasons set forth above with respect to claim 10.

Claims 30-34 depend from claim 29 and are allowable for at least the same reasons set forth above with respect to claim 29.

Claim 30 is also separately allowable for at least the reasons set forth above with respect to claim 11.

f. Claim 35 and its dependent claims

Claim 35 as amended is directed to an apparatus that includes means for transmitting a first training symbol on a plurality of antennas. The first training symbol comprises a plurality of data symbols, and each of the plurality of data symbols corresponds to different ones of a plurality of tones. Each of the plurality of antennas transmits a corresponding one of the plurality of data symbols.

Claim 35 is allowable for at least the reasons set forth above with respect to claim 1.

Claims 36-43 depend from claim 35 and are allowable for at least the reasons set forth above with respect to claim 35.

Claim 36 is also separately allowable for at least the reasons set forth above with respect to claim 2.

Claim 37 is also separately allowable for at least the reasons set forth above with respect to claim 3.

Claim 38 is also separately allowable for at least the reasons set forth above with respect to claim 4.

g. Claim 44 and its dependent claims

Claim 44 as amended is directed to an apparatus that includes means for receiving a first training symbol transmitted by a plurality of antennas and means for determining a gain at each of the plurality of antennas for each of a plurality of tones in response to at least the first training symbol. The first training symbol comprises a plurality of data symbols, and each of the plurality of data symbols corresponds to different ones of a plurality of tones. Each of the plurality of data symbols is received from a corresponding one of the plurality of antennas.

As discussed above, Mody does not teach or suggest a first training symbol that comprises a plurality of data symbols, wherein each of the plurality of data symbols corresponds to different ones of a plurality of tones. Accordingly, claim 44 is allowable for at least the reasons set forth above with respect to claim 10.

Claims 45-49 depend from claim 44 and are allowable for at least the reasons set forth above with respect to claim 44.

Claim 45 is also separately allowable for at least the reasons set forth above with respect to claim 11.

h. Claim 50 and its dependent claims

Claim 50 as amended is directed to a computer program for transmitting a first training symbol on a plurality of antennas. The first training symbol includes a plurality of data symbols, and each of the plurality of data symbols corresponds to different ones of a plurality of tones. Each of the plurality of antennas transmits a corresponding one of the plurality of data symbols.

Claim 50 is allowable for at least the reasons set forth above with respect to claim 1.

Claims 51-58 depend from claim 50 and are allowable for at least the reasons set forth above with respect to claim 50.

Claim 51 is also separately allowable for at least the reasons set forth above with respect to claim 2.

Claim 52 is also separately allowable for at least the reasons set forth above with respect to claim 3.

Claim 53 is also separately allowable for at least the reasons set forth above with respect to claim 4.

i. Claim 59 and its dependent claims

Claim 59 as amended is directed to a computer program for receiving a first training symbol transmitted by a plurality of antennas and determining a gain at each of the plurality of antennas for each of a plurality of tones in response to at least the first training symbol. The first training symbol includes a plurality of data symbols, and each of the plurality of data symbols

corresponds to different ones of a plurality of tones. Each of a plurality of subsets of the plurality of data symbols is received from a corresponding one of the plurality of antennas.

As discussed above, Mody does not teach or suggest a first training symbol that comprises a plurality of data symbols, wherein each of the plurality of data symbols corresponds to different ones of a plurality of tones. Accordingly, claim 59 is allowable for at least the reasons set forth above with respect to claim 10.

Claims 60-64 depend from claim 59 and are allowable for at least the reasons set forth above with respect to claim 59.

Claim 60 is also separately allowable for at least the reasons set forth above with respect to claim 11.

j. Claim 65 and its dependent claims

Claim 65 as amended is directed to a system including first and second transceivers. The first transceiver includes a first plurality of antennas and a transmit training module to transmit a first training symbol on the first plurality of antennas. The first training symbol comprises a plurality of data symbols, and each of the plurality of data symbols corresponds to different ones of a plurality of tones. Each of the first plurality of antennas transmits a corresponding one of the plurality of data symbols. The second transceiver includes a second plurality of antennas and a receive training module. The receive training module receives the first training symbol and determines a gain at each of the first plurality of antennas for each of the plurality of tones in response to at least the first training symbol.

As discussed above, Mody does not teach or suggest a first training symbol that comprises a plurality of data symbols, wherein each of the plurality of data symbols corresponds to different ones of a plurality of tones. Accordingly, claim 65 is allowable for at least the reasons set forth above with respect to claim 1.

Claims 66-73 depend from claim 65 and are allowable for at least the reasons set forth above with respect to claim 65.

Claim 66 is also separately allowable for at least the reasons set forth above with respect to claim 2.

Claim 67 is also separately allowable for at least the reasons set forth above with respect to claim 3.

Claim 68 is also separately allowable for at least the reasons set forth above with respect to claim 4.

k. Claim 74 and its dependent claims

Claim 74 as amended is directed to a system including first and second transceivers. The first transceiver includes a first plurality of antennas and means for transmitting a first training symbol on the first plurality of antennas. The first training symbol comprises a plurality of data symbols, and each of the plurality of data symbols corresponds to different ones of a plurality of tones. Each of the first plurality of antennas transmits a corresponding one of the plurality of data symbols. The second transceiver includes a second plurality of antennas, means for receiving the first training symbol, and means for determining a gain at each of the first plurality of antennas for each of the plurality of tones in response to at least the first training symbol.

As discussed above, Mody does not teach or suggest a first training symbol that comprises a plurality of data symbols, wherein each of the plurality of data symbols corresponds to different ones of a plurality of tones. Accordingly, claim 74 is allowable for at least the reasons set forth above with respect to claim 1.

Claims 75-82 depend from claim 74 and are allowable for at least the reasons set forth above with respect to claim 74.

Claim 75 is also separately allowable for at least the reasons set forth above with respect to claim 2.

Claim 76 is also separately allowable for at least the reasons set forth above with respect to claim 3.

Claim 77 is also separately allowable for at least the reasons set forth above with respect to claim 4.
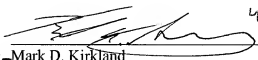
II.   Conclusion

No fees are believed to be due at this time. Please apply any other charges or credits to deposit account 06-1050.

Respectfully submitted,

Date: 3-9-07

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